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Lakes Study (October 1989)

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See revised Land Use Districts
and Standards 6/17/90.

MAINE'S FINEST LAKES

The Results of the Maine Lakes Study

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A Report Prepared for the
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Planning Report No. 90

Maine State Planning Office
Critical Areas Program

October 1989

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ACKNOWLEDGEMENTS

The authors wish to express their appreciation to the biologists, geologists, naturalists and other lake experts who gave willingly of their time to provide information for this report. Many of these contributors are identified in the "Resource Category Methods" section. In particular we acknowledge the efforts of resource specialists who coordinated the assessment for each of the resource categories, including Al Clark, Jeff Dennis, Owen Fenderson, Art Spiess, Hank Tyler, and Tom Weddle.

Hank Tyler, director of the Maine Critical Areas Program, provided insight and guidance throughout the project.

INTRODUCTION

A lake is the landscape's most beautiful and expressive feature. It is the earth's eye, looking into which the beholder measures the depth of his own nature. - Thoreau

Lakes are a particularly northern phenomenon. As temporary geological features, lakes typically belong to a young landscape, a place with clear skies, pine forests, and rushing streams. Some lakes last a few centuries, others perhaps a few thousand years before they eventually fill with silt or vegetation.

Maine is famous for its many beautiful lakes. Within the state there are over 6,000 lakes, a total that exceeds that of all other northeastern states combined. Maine's lakes range in size from less than an acre to over 70,000 acres. While there are noteworthy concentrations in certain areas, lakes are distributed throughout the state; only in rare instances must Maine residents travel farther than five miles to enjoy lake amenities.

Lakes are created when natural or human-made features hold back water in its journey to the sea. Some lakes and ponds are maintained by groundwater, which intersects the surface of the ground and is impeded, at least temporarily, in its ceaseless quest for a lower elevation; if a lake's drainage basin is large it tends to maintain a fairly constant level all year. Others, including many mountain lakes, are fed largely by surface runoff from rain and melting snow, and fluctuate in level according to the season.

Maine's lakes are as varied as they are extensive. While most were formed by glacial processes, the resultant sculptures took many forms. Some lakes, including Sabattus Pond, have regular shorelines; others, as, for example, Cobbosseecontee, are highly configured with bays, islands, and narrows. Many, perhaps the majority, are forested to waters edge. Others are ringed with bedrock and cliffs. Still others are bordered by marsh, peatlands, and beaches.

Lakes are associated with a variety of landforms. Many of Maine's most picturesque lakes are tucked between mountains. The lakes on Mount Desert Island are perfect examples of this type of lake. Other lakes, such as Sebago, lie in lowlands. Lowland lakes, largely developed in glacial outwash, are known for their beautiful sandy beaches, forested shorelines, and recreational opportunities. Still others, like Speck Pond, are located near the top of mountains. These mountain lakes are often bordered by rocky shores and steep cliffs that make striking views.

Lakes are critical to the survival of the state's fish and wildlife resources. Both cold and warm water fish species depend on these water bodies for habitat during much, if not all, of their life cycle. Lakes are no less important for wildlife, providing habitat for water birds, birds of prey, fur bearers, and game animals.

Many lake-related natural features have been recognized as being of statewide significance by the Maine Critical Areas Program, including rare plants, heron rookeries, old-growth forest stands, and peatlands. In some instances entire lakes have been

identified as warranting Critical Area status due to the presence of blueback charr, an extremely rare form of arctic charr.

Many of Maine's lakes have been enlarged by dams placed across their outlet streams. Some of these dams were constructed to assist in the transport of logs, others to store water for downstream industrial, agricultural, or municipal uses. These dams hold the sediment that is deposited by the streams that help fill the lake. It is therefore common to find a sandy delta at the mouth of a stream feeding into quiet lake waters. Over the years the delta will grow, gradually but steadily filling the lake. This is occurring at Sebago Lake among others.

While lakes may be temporary features from a geological perspective, people have long valued them for their apparent qualities of stability and repose. Americans began to value lakes during the transition from a rural to an urban culture; lakes then held appeal as refuges. Early in this century, summer places were built on some lakeshores. However, most lakes remained undeveloped by virtue of their isolation. After World War II more roads penetrated into the woods; suddenly lakes were only a few miles from town.

Today lakes are being ringed with residential and recreational development at an unprecedented rate; the prospect is that this trend will continue. The lakes have not gotten any bigger or more numerous, but there are more and more people wanting to use them. This leads to an increased need for management and conservation of lake resources.

The principal laws in Maine governing lakes are the Great Ponds Act and the Shorelands Zoning Act. The Great Ponds Act defines a great pond as any lake or pond with a surface area of 10 acres or more. The act identifies the State's interest in these great ponds and confers ownership of these water bodies to the public. The Shorelands Zoning Act requires that municipalities establish appropriate shorelands zoning ordinances along lake and river shorelands.

As natural resources worthy of the state's attention, management of Maine's lakes often transcends agency boundaries. Besides the State Planning Office (SPO), there are at least three other agencies with active programs related to lakes. The Department of Environmental Protection (DEP) has a division solely committed to the management of lake-related water quality. The Department of Inland Fish and Wildlife (DIFW) also focuses major energies on lake management; to date, DIFW has conducted detailed field surveys on over 700 lakes.

Bureaus within the Department of Conservation (DOC) are also involved in a number of ongoing lake-related activities. The Land Use Regulation Commission (LURC) actively participates in lake management within the unorganized portion of the State through the Commission's land use planning and zoning authority. The Bureau of Public Lands (BPL) manages several parcels adjacent to lakes including noteworthy holdings on Upper Richardson and an entire township in northern Maine that includes such outstanding ponds as Deboullie, Gardner, and Togue. The Bureau of Parks and

Recreation (BPR) also is active in lake management, with numerous parks and recreational facilities including Lake St. George, Sebago Lake, and Damariscotta Lake State Parks.

Increased lake development and use pressures dictate a need for more lake information in order to meet existing and future policy demands. Although a great deal of lake inventory work has been accomplished by state agencies, prior to 1986 no statewide attempt had been made to catalogue this information systematically to meet interagency needs. Nor had there been any attempt to analyze information in order to identify lakes that should be given recognition due to their exemplary natural values.

In recognition of this need, the Department of Conservation's Land Use Regulation Commission conducted the Maine Wildlands Lake Assessment. This study, completed in June of 1987, focused on lakes within the unorganized portion of the state. The study inventoried a variety of natural values associated with lakes 10 acres or larger in size including fish, wildlife, scenic values, shoreline character, cultural features, botanic features, and physical features. Each feature associated with a given lake was rated: "outstanding", "significant", or "did not meet minimum standards". Lakes were then comparatively evaluated according to their overall natural resource significance. Lakes with statewide, regional and local significance were identified.

The Wildlands Lake Assessment also created a computerized data management system. The system, currently housed on LURC's Burroughs mini-computer, will be available to all agencies and will allow for the addition of new information as it becomes available. The LURC project ultimately resulted in the adoption of a Lake Action Program by the Commission that will guide future lake-related land use decisions in the state's unorganized territories.

The Maine Lakes Study, the subject of this report, adapts the Wildlands Lake Assessment inventory process for the organized portion of the state. The study had two objectives: 1) to create a lake resource data base for lakes within the organized townships, and 2) to combine these results with those of the LURC project and identify lakes with resource values of statewide significance.

Hopefully the Maine Lakes Study will, in combination with the Wildlands Lake Assessment, help to stimulate interest in the wise use and management of these significant and vulnerable resources.

OVERVIEW OF STUDY METHODS

The process used to conduct the Maine Lakes Study consisted of several steps. In summary form these were as follows:

1. Identification of lakes to be included in the assessment.

A computerized master list of lakes was developed that provides the following information:

Lake name

Maine Inventory and Data Analysis System (MIDAS) number

Township name

Department of Inland Fish and Wildlife management region

Surface area (in acres)

All lakes wholly within the organized townships that are 10 acres or greater in size were included in the assessment. Lakes partially within the organized towns were excluded as these were previously inventoried in the Maine Wildlands Lake Assessment.

2. Identification of resource categories to be inventoried.

Resource categories included:

Fish

Wildlife

Botanic Features

Physical Features (geologic and hydrologic)

Cultural Features

Scenic Features

Shoreline Features (including beaches)

These categories were the same as was used in the Maine Wildlands Lake Assessment with the exception that the physical features category was subdivided into geologic and hydrologic components.

3. Design of an inventory/assessment process for each resource category.

For each resource category a study process was developed which identified 1) who would be responsible for data collection and oversight, 2) the sources of information that would be consulted, 3) the criteria that would be used to assess significance, 4) the process that would be followed, 5) the entries that would be included on the data collection forms, and 6) the schedule for completion.

4. **Assessment of lakes for each resource category.**

Comparative significance assessments were conducted separately for each resource category. All assessments used a common reporting protocol. For each category lakes were identified that were "outstanding" or "significant". A rating of outstanding indicated that the resource feature should be recognized as being of statewide significance.

Assessments were conducted using secondary information sources were possible. In the case of scenic and shoreline features field inventories were conducted.

5. **Review of preliminary findings.**

Preliminary findings were distributed to study participants and other knowledgeable persons for review. Findings were revised as appropriate.

6. **Synthesis of findings**

Information from each resource category was combined for each lake using a computer database.

7. **Comparative evaluation.**

Lakes were identified that possessed multiple and/or unique resource values. A summary narrative was prepared for each. Those lakes meeting the multiple value standard were defined as being of statewide significance.

8. **Synthesis with LURC lake data.**

Findings were merged with those of the Maine Wildlands Lake Assessment.

The next section of this report presents a summary of the methods used for each resource category. A more detailed description of study methods can be found in Appendix A.

RESOURCE CATEGORY METHODS

FISH

Overview

Maine lakes contain the best fishery resources anywhere in New England; nowhere else in the eastern United States can such a variety and abundance of fish stocks be found. Salmon, togue, brook trout, and other cold water and warm water fish species abound in the state's lake waters. Sporting camp owners have long recognized this valuable resource, as do thousands of fisherman each year.

Common coldwater fish species occurring in Maine lakes include:

- o landlocked salmon (Salmo salar sebago)
- o brown trout (Salmo trutta)
- o rainbow trout (Salmo gairdneri)
- o lake trout (Salvelinus namaycush)
- o brook trout (Salvelinus fontinalis)

Common warmwater fish species found in Maine lakes include:

- o smallmouth bass (Micropterus dolomieu)
- o largemouth bass (Micropterus salmoides)
- o chain pickerel (Esox niger)
- o hornpout (Ictalurus nebulosis)
- o yellow perch (Perca flavescens)

The blueback and the sunapee, two separate and very rare populations of landlocked Arctic charr (Salvelinus alpinus oquassa) also occur in Maine.

Beyond their value as a recreational resource, fish are an integral part of the lake ecosystem. They are an important food source for many wildlife species. Loons and common mergansers depend on juvenile fish and small bait fish for food. River otters also consume small bait fish (many a fisherman has followed an otter trail to a good fishing hole). Bald eagles, a federal endangered species, fish along Maine lake shores. Fish populations also provide critical indications of the water quality and the general environmental well-being.

Standards

To be included in the fish assessment, lakes had to meet three minimum standards:

- o 10 acres or more in size,
- o occur wholly within an organized township, and
- o contain a fishery or the potential for a fishery

Lakes less than 10 acres in size that contained an exceptionally high quality fishery; lakes with uncommon or rare fish species were also assessed.

A master list of those lakes located entirely within Maine's organized townships was distributed to state fisheries managers in each MDIFW region. Each fisheries manager was asked to:

1. Identify lakes meeting minimum standards, i.e., that are known to support a viable fishery.
2. Rate the habitat and species value of each lake meeting the minimum standards. (Habitat value ratings were based on water quality and on physical factors such as available spawning sites, substrate, and feeding sites. Species value ratings were based on species abundance, diversity, rarity, and reproduction.)
3. Rate the public use value of each lake meeting the minimum standards. Public use ratings were based on fishing quality, aesthetic experience, fishing pressure, and economic importance.

Each lake meeting minimum standards was rated according to the relative value of that lake's fish habitat, species composition, and public use. The terms "high", "medium", or "low" were used to depict the ratings for each factor. A high rating was reserved for especially noteworthy features; a medium rating was used for more typical features. A low rating meant that the resource was limited, not present, or severely degraded.

Information from the completed assessments was entered into the DIFW computer. High, medium, and low ratings were assigned numerical ratings of 3, 2, and 1. Lakes with total values of 24+ points were ranked as outstanding and lakes with 14-24 points were ranked as significant. These cut-off points were established after arraying the data and identifying logical significance breaks.

These preliminary findings were circulated to field and state level biologists for final review.

Participants

Owen Fenderson, Fisheries Planner
Kendall Warner, Management Supervisor
DIFW regional fisheries biologists

Information Sources

Published lake surveys
Computerized lake inventory file
MDIFW regional office files

WILDLIFE

Overview

Maine lakes support a diversity of water-dependent wildlife ranging from the secretive and rare blanding's turtle to the stately common loon. River otters, mink, beaver, and moose utilize the abundant food resources found in the state's lakes while making their home in upland or riparian habitat. Bald eagles, osprey, and great blue herons nest on undisturbed lake shores. The presence and relative abundance of these species are indicators of the health of Maine lakes. No other state in the northeast hosts such a rich assemblage of lake-dependent wildlife species.

Standards

To be included in the wildlife assessment lakes had to meet three minimum standards:

- o 10 acres or more in size,
- o be located entirely within an organized township, and
- o have one of the following features:
 - significant wetland habitat
 - colonial nesting waterbirds
 - a rare state or federal species
 - a deer wintering area
 - an unusually high concentration of wildlife

Lakes less than 10 acres in size that contained one or more of these features were also considered in the assessment.

A master list of those lakes located entirely within Maine's organized townships was distributed to state wildlife managers in each DIFW region. Each wildlife manager was asked to:

1. Identify lakes meeting the minimum standards, i.e., those lakes known to support significant populations of wildlife .
2. Rate the habitat and species value of each lake meeting the minimum standards. Species value ratings were based on abundance, diversity, and rarity. Habitat value ratings were based on the type and amount of wetlands, riparian areas, and uplands adjacent to the lake.
3. Rate the public use value of each lake meeting the minimum standards. Public use ratings were based on hunting use, trapping use, and wildlife viewing opportunities.

For each lake the habitat, species, and public use factors identified earlier were evaluated by DIFW regional biologists. The measure used to accomplish this rating was

relative importance compared to other lakes in the region. The terms "high", "medium", and "low" were used to depict relative importance. Using this system a typical resource was given a medium rating. A high rating was reserved for exceptional resources and a low rating for limited or degraded resources. Information provided by regional biologists was reviewed for completeness and accuracy by the DIFW state office. After this review findings were circulated back to regional biologists for final review.

Lakes were then placed in a hierarchy with those lakes receiving a substantial number of high ratings being listed first. Meaningful cut-off points were then established. Lakes with a substantial number of high ratings were given an overall rating of "outstanding". Other lakes that possessed noteworthy species, habitat, or public use were rated significant. A lake that provided critical habitat for endangered, threatened, rare, or otherwise special wildlife species was rated outstanding regardless of its rating for other factors.

Participants

Gary Donovan, Director of Wildlife Division
 Mark Stadler, Regional Management Supervisor
 George Matula, Resource Assessment Supervisor
 Alan Clark, Wildlife Resource Planner
 Regional wildlife biologists
 Resource assessment biologists

Information Sources

DIFW regional office files
 DIFW research reports and maps
 DIFW Endangered and Nongame Program files
 Critical Areas Program files
 The Nature Conservancy Natural Heritage Program data base
 Maine Audubon Society files

PHYSICAL FEATURES

Overview

When the glaciers retreated 10,000 years ago, the State of Maine was left with a cornucopia of lakes containing a rich assortment of noteworthy physical and geological features. Cliffs, sand beaches, and bedrock outcrops are noteworthy geologic features; subtler or less common features include fossil localities, relic shorelines, caves, waterfalls, reverse deltas, moraines, and kettleholes.

Certain Maine lakes also exhibit unique hydrological characteristics such as extremely low nutrient content, naturally high alkalinity, natural eutrophication, and chemical stratification. Often associated with these features are groups of species specifically adapted for living in such environments. For purposes of this report physical features are divided into geologic features and hydrologic features.

Standards

To be included in the lakes assessment, geologic or hydrologic features had to be:

- o in the lake,
- o within a 250 feet of a lake (the shoreland zone), or
- o a dominant feature in the landscape as viewed from the lake.

For the geology component, a master list of those lakes located entirely within Maine's organized townships was distributed to geologists who have conducted field work for the Maine Geological Survey. Each geologist was asked to identify lakes that contained significant fossil localities, significant bedrock outcrops, sand beaches, cliffs, caves, waterfalls, relic shorelines, reverse deltas, significant glacial features, unusual hydrogeological features, or mineral resources.

The geologists were then asked to highlight any feature that was either 1) a type locality, 2) a rare occurrence, 3) an outstanding example, or 4) critical to geologic interpretation. Features that met any of these form criteria were given a final rating of outstanding. Others were given a rating of significant.

For the hydrology component, a master list of lakes located entirely within Maine's organized townships was sent to the Hydrology Coordinator of the Maine Department of Environmental Protection (DEP). DEP lake specialists identified lakes that contain exceptional depth, exceptional water clarity, unusual water chemistry, springs; or other significant hydrological features.

Hydrological features were ranked outstanding if they were 1) a rare occurrence, 2) critical to the interpretation and understanding of the hydrology of a region or 3) an outstanding example of a particular feature. Other noteworthy hydrologic features were given a rating of significant. The level of significance was qualitatively determined using professional judgement.

Geology Participants

Tom Weddle, Maine Geological Survey
Woodrow Thompson, Maine Geological Survey
Allan Ludman, Department of Geology, Queens College
Louis Pavlides, U.S. Geological Survey
Robert B. Neuman, Washington, DC
John Creasy, Department of Geology, Bates College
Thomas Brewer, Holliston, MA
William A. Newman, Department of Geology, Northeastern University
Olcott Gates, Wiscasset, ME
Richard Gilman, Department of Geology, SUNY, Fredonia, NY
John Griffin, Lincoln, NE

Hydrology Participants

Jeff Dennis, DEP Hydrology Coordinator
DEP Lake Specialists

Information Sources

State of Maine Critical Areas Program reports
Maine Geological Survey reports and files
U.S. Geological Survey reports
DEP Lakes Information computer data base

BOTANIC FEATURES

Overview

Maine lakes contain a variety of valuable botanic features, both rare and common, which are an integral part of lake ecosystems. Lakes containing sedges, smartweeds, and rushes provide important waterfowl breeding and staging areas. Deer use cedar forests along lake edges for wintering areas; and many other wildlife species depend on lake-related plants for food, cover, hunting perches, and nesting material.

Shoreline vegetation acts as a natural filtration mechanism, filtering upland runoff before it empties into a lake, while aquatic vegetation often acts as a water quality monitor. Because many aquatic species tolerate only narrow ranges of water conditions, species presence or absence may indicate high or low acidity, alkalinity, productivity, or water clarity.

Botanic features also have aesthetic value; for instance, the presence of a mature forest along a lakes edge greatly enhances local scenic beauty and shoreline character.

Standards

To be included in the botanic feature assessment a lake had to be:

- o 10 or more acres in size,
- o entirely within an organized township, and
- o contain at least one significant botanic feature.

All botanic features had to be within a 250-foot shoreland zone. Priority was given to plants or plant communities that are water-dependent. Pertinent botanical information was compiled from existing information sources. In addition, a questionnaire was sent to botanists who have worked in Maine.

Rare Plants

A draft list of Maine's rare, threatened, and endangered plants prepared by the Endangered Plant Technical Advisory Committee was used as a guide for evaluating plant rarity. The following definitions applied:

- o Endangered plants -- species that have only one documented occurrence within the past 20 years including federal endangered plants. Lake related endangered plants include:

Arctic-loving Willow (Salix arctophila)
 Bitter-cress (Cardamine bellidifolia)
 Bitternut Hickory (Carya cordiformis)
 Flatleaf Willow (Salix planifolia)

Horned Rush (Rhynchospora capillacea)
 Meadowsweet (Spiraea septentrionalis)
 Pondweed (Potamogeton freisii)
 Reed Bentgrass (Calamagrostis pickeringii)
 Sedge (Carex saxatilis)
 Spike-rush (Eleocharis pauciflora)
 Spike-rush (Eleocharis tuberculosa)
 Vasey's Pondweed (Potamogeton vaseyi)
 Water-Starwort (Callitriche anceps)
 Yellow-eyed Grass (Xyris smalliana)

- o Threatened plants -- species that have only two to four documented occurrences during the past twenty years or are federal threats. Lake related threatened plants include:

Atlantic White Cedar (Chamaecyparis thyoides)
 Clammy Azalea (Rhododendron viscosum)
 Great Rhododendron (Rhododendron maximum)
 Pondweed (Potamogeton confervoides)
 Pondweed (Potamogeton pulcher)
 Sedge (Hemicarpha micrantha)
 Small Purple Bladderwort (Utricularia resupinata)
 Sweet Pepperbush (Clethra alnifolia)

- o Additional categories -- populations that are small, confined to a geographic area, or clearly and imminently jeopardized.

Natural old-growth forest stands

Natural old-growth forest stands were included if they met the minimum standards, and if:

- 1) the stand contained a significant number of trees that were 100 years of age or older;
- 2) the stand contained long-lived species characteristic of a sub-climax or climax forest;
- 3) the old growth component was a stand, part of a group of stands, or was growing in association with a stand; and
- 4) the stand appeared to be undisturbed by humans.

Jack/pine stands

Jack pine (Pinus banksiana) stands were included in the assessment if they met the Critical Areas Program criteria, which evaluate population size, stand purity, age, level of disturbance, habitat uniqueness, and geographic distribution.

Peatlands and unique freshwater wetlands

Peatlands and freshwater wetlands were included in the assessment if they contained rare, threatened, or endangered plants, or if they were unique in size, location, physical makeup; or other features.

All botanical information was entered into a master computer data base. Lakes that contained endangered or threatened plants were automatically rated outstanding. Lakes with special concern or watch list plant species were rated significant. Lakes with natural old growth stands were rated significant. Peatlands and freshwater wetlands were individually assessed by resource experts and rating determined using professional judgement. No Jack pine stands were identified on any lakes in the study area and thus a rating scheme was not established for this resource.

Participants

Hank Tyler, Critical Areas Program
Trish DeHond, Critical Areas Program
Amy Forrester, The Nature Conservancy

Information Sources

Maine State Planning Office publications
Critical Areas Program topographic maps
The Nature Conservancy's Heritage Program data base

SCENIC QUALITY

Overview

Scenic quality was evaluated from the perspective of views available from a lake, based on two main assumptions: 1) Landscapes of mountains, hills, and unaltered forested terrain adjacent to a lake are visually pleasing; and 2) As the variety of landscape features increases, so does the overall scenic beauty of a lake. Based on these premises, the level of scenic quality for a lake is generally proportional to lake size and local topographical relief.

This assessment considered the overall scenery of a lake, rather than scenery from a single view at specific locations.

Standards

The assessment process largely followed that described in Scenic Lakes Evaluation in Maine's Unorganized Towns, prepared in 1987 as part of the Maine Wildlands Lake Assessment.

An initial list of potentially scenic lakes was developed by visually inspecting topographic maps for areas of high relief. The edge index (ratio of shoreline length to surface area) was then calculated for each lake on the list.

To remain on this list, the lakes had to meet the following criteria:

- o Exhibit a 300 foot change in relief within 0.5 miles of the lake, or
- o Exhibit a 700 foot change in relief within 7.0 miles, or
- o Have an edge index of at least 1.5.

The master list was further refined as follows:

- o Large lakes, greater than 1,000 acres, were removed from consideration if they had less than 4 areas of significant relief.
- o Medium sized lakes, 500 to 999 acres, were removed if they had less than 3 areas of significant relief.
- o Small lakes, 10 to 499 acres, were removed if they had less than 2 areas of significant relief.

Lakes were added to the list if they:

- o Appeared to be remote. (Remote lakes included lakes that did not contain vehicular access within a quarter mile of the shoreline. These

were identified by reviewing maps contained in the Maine Atlas and Gazetteer, published by the DeLorme Mapping Company, Freeport, Maine.)

- o Were located above 1,800 feet in elevation, or
- o Had an area of significant relief (1,000 feet or more) within 1 mile.

Lakes that met all of the minimum standards were evaluated from the air. During the flight the following factors were evaluated:

- foreground and background relief
- number and distribution of physical features
- shoreline vegetational diversity
- special features (e.g. extreme water clarity)
- inharmonious development

A numerical rating was given to each factor that reflected the extent to which a lake displayed the characteristic. After the flight points were totaled for each lake. Numerical ratings from the flight data forms varied from 20 to 75 out of a total of 100 possible points. Lakes with ratings greater than 60 were designated outstanding. Lakes with ratings of 40 - 55 were designated significant. These point cut-offs were determined by arraying the data and identifying logical significance breaks.

Participants

Hank Tyler, Critical Areas Program
Drew Parkin, Scenic evaluation
John Lortie, Scenic evaluation

Information Sources

No base of consistent published or unpublished information on visual quality of lakes within the organized portion of the state was available.

SHORELINE CHARACTER

Overview

Shoreline character refers to physical features at the lake's edge and their relationship to recreational use of the lake. Shore features such as beaches, ledges, and open areas are included to the extent that they enhance opportunities for swimming, diving, wading, camping, picnicking, fishing, or boating.

Standards

Lacking an established base of information for Maine lake shorelines, lakes included in the shoreline character evaluation were limited to the 115 lakes flown for scenic assessment. In addition to aerial evaluation, resource experts were consulted about shoreline information. Given the lack of information, the resulting list of lakes may be incomplete and some lakes with significant or outstanding shoreline characteristics may have gone unreported.

During the flights, three major features determined the significance of lakes for shoreline character:

- o Beaches
- o Bedrock ledges
- o Open shores

Beaches and bedrock ledges that were large and dominant were regarded as more significant than small narrow beaches and ledges. Open shorelines that offered public use opportunities, swimming, fishing, hiking, and canoeing, were regarded as more significant than shorelines with little or no public use opportunity.

A rating of high, medium, or low, was assigned to each lake that was flown based on the overall significance of all shoreline character features. Additional lakes that have beaches were rated by resource experts. Lakes that received a rating of high were designated outstanding, and lakes rated as medium were designated significant. All lakes with beaches received a minimum rating of significant. If the beaches were large and extensive, or if other significant shoreline character features were found, the lakes were rated outstanding. An outstanding rating was given to any lakes with a high diversity of shore features or a unique shore feature.

Participants

Hank Tyler, Critical Areas Program
 Drew Parkin, Shoreline character evaluation
 John Lortie, Shoreline character evaluation

Information Sources

Maine Geological Survey aerial photos
Maine Department of Inland Fisheries and Wildlife personnel
Resource experts, via questionnaire

CULTURAL FEATURES

Overview

People have lived in Maine since the last ice sheets retreated over 10,000 years ago. Being such dominant features in the landscape, and providing essential elements for survival, lakes were extensively used by prehistoric peoples. After the arrival of European settlers, lakes retained their position as a focus for human activity. Given this long history of use, it is not uncommon to find significant historic structures, trails, and prehistoric settlements within close proximity to lakes. These sites provide a critical link to the past and add to the overall environmental significance of our lakes.

Standards

Cultural features were classified into four general groups: 1) prehistoric archeological features, 2) historic archeological features, 3) historic structures, and 4) other lake-related cultural features. In general, cultural resources within the shoreland zone (up to 250 feet from the lake) were included in the assessment. Cultural features beyond the shoreland zone were included if they had a direct connection to a lake, such as Indian canoe routes.

Resources included in the assessment were identified using existing sources of information. Individual resource experts from the Maine Historic Preservation Commission outlined the significance of each cultural feature.

Cultural resources for each lake were entered into a computer data base under the four groups listed above. Each feature was rated significant, outstanding, or unknown, except for lakes with multiple features, which received an overall rating. Features on state or federal registers were automatically given a rating of outstanding. Other features were rated using professional judgement. Lakes with multiple significant features were given a rating of outstanding.

Participants

Arthur Spiess, Maine Historic Preservation Commission (MHPC)
Robert Bradley, MHPC
Kirk Mohny, MHPC

Information Sources

Maine Archeological Survey
National Register of Historic Places
Statewide Historic Archeological Inventory
Maine Historic Preservation Commission

RESOURCE CATEGORY FINDINGS

FISH

Outstanding fisheries: 53 lakes; 97,604 surface acres
Significant fisheries: 536 lakes; 164,841 surface acres

The high number of lakes designated as having outstanding or significant fisheries can be attributed to the numerous clean, unpolluted lakes in the state, and to the availability of information from annual lake assessment studies performed by MDIFW. Many of the outstanding lakes contain trophy-size salmon and trout. These lakes are typically deep, with good populations of prey species, and not over-fished. Good trout fisheries are located throughout the state's organized townships. Extreme southern Maine has fewer lakes than other parts of the state. Consequently it has fewer lakes rated as outstanding or substantial trout fisheries.

Largemouth bass are restricted primarily to the southern and eastern parts of the state, while smallmouth bass are found in every county except Aroostock. Both bass species are actively sought by fishermen because of their leaping ability and tenacity.

WILDLIFE

Outstanding wildlife: 133 lakes; 78,245 surface acres
Significant wildlife: 177 lakes; 50,753 surface acres

Maine is famous for its loons. No other bird or animal is so closely associated with the public's conception of the idyllic Maine lake. While most prevalent in the unorganized portions of the state, this bird can also be found on several lakes in the organized townships. Given its solitary nature the loon is most likely to be found in the more remote areas of large lakes. Of the land animals the moose is the one typically affiliated with Maine's lakes. Like the loon, the moose is most common in the state's unorganized townships. Several lakes in the organized towns are, however, also noted for their ability to attract this large animal.

While the loon and moose get much of the attention, a great variety of wildlife species depend on lakes for at least part of their life cycle. Of the birds, herons, waterfowl, and raptors, especially eagles and osprey, all depend on lakes. Animals found in the riparian areas surrounding lakes include a variety of fur bearers, reptiles (especially turtles), and other non-game species. Deer wintering areas are often found in uplands surrounding lakes. Endangered species that utilize lakes in the organized portion of the state include the Blanding's turtle and the bald eagle.

A great deal of energy has been expended surveying certain lake related species, notably loons, herons, and endangered species such as the bald eagle and Blanding's turtle. Much of the information pertaining to the use of lakes by other species is unfortunately

anecdotal. However, certain inferences can be drawn. First, larger lakes appear to have proportionately greater wildlife value than smaller lakes. Also, lakes with convoluted shorelines and with a variety of wetland and upland habitats are often associated with high wildlife value. Shallow lakes and those with extensive marshy areas surrounding inlets or outlets further appear to produce high concentrations of wildlife. Lastly, undeveloped lakes, or lakes with large undeveloped shoreline areas seem to have proportionately greater wildlife values.

PHYSICAL FEATURES

Outstanding physical features: 6 lakes; 5,413 surface acres

Significant physical features: 62 lakes; 69,263 surface acres

Sand beaches and rock outcrops were the most common significant geological features reported for Maine lakes. Most well-developed sand beaches were reported from large lakes like Sebago Lake in Cumberland County. This lake contains nine beaches, including an uncommonly large barrier beach. Halls Pond and Androscoggin Lake contain outstanding rock outcrops. Of the 22 lakes with significant rock outcrop five are in Acadia National Park. Cliffs on Eagle Lake, the Tarn, and Echo Lake were among the most striking features reported.

Twenty-one lakes contain significant hydrological features as follows:

	<u>Town</u>	<u>Size (Acres)</u>	<u>DIFW Region</u>
Lakes with Boiling Springs:			
Page Pond	Fort Fairfield		G
Lakes with Naturally High Acidity:			
Carlton Bog	Troy	430	B
Chemically Stratified Meromatic Lakes:			
Carry Lake	Littleton	20	G
Conroy Lake	Moticello	25	G
Wellman Pond	Belgrade	9	B
Lakes with Extremely Low Nutrient Content:			
Basin Pond	Fayette	32	B
Clearwater P	Industry	751	D
Craig Pond	Orland	218	C
Jordan Pond	Mount Desert	187	C
Schoodic P	Brownville		F
Trickey	Naples	311	A
Tunk Pond	Sullivan	141	C
Naturally Eutrophic Lakes:			
Halls Pond	Paris	51	A
Holt Pond	Bridgeton	25	A
Kidder Pond	Vienna	19	B
Nubble Pond	Raymond	23	A
Portage Lake	Portage Lake	2474	G
Lakes with a Naturally High Alkalinity:			
Carry Lake	Littleton	20	G
Page Pond	Ft. Fairfield		G
Portage Lake	Portage Lake	2474	G
Ross Lake	Littleton	32	G
Tyler Pond	Manchester	17	B

BOTANIC FEATURES

Outstanding botanical features: 24 lakes; 22,191 surface acres

Significant botanical features: 30 lakes; 47,266 surface acres

Rare aquatic or semi-aquatic shrubs including Clethra alnifolia, Ilex laevigata, Viburnum edule, and Lonicera oblongifolia were found associated with nineteen lakes. Most of these shrubs grow in shallow wetlands. Lakes supporting any of these rare shrubs were rated "outstanding" for botanical features. Other lakes rated outstanding possessed true aquatic plants like Potamogeton pulcher, P. vaseyi, P. confervoides, and Nymphaea tertragona.

Other important lake-related botanic features included five old growth forest areas, a variety of rare sedges, orchids, and shrubs, and seven additional species of true aquatic plants that are rare within Maine. Lakes with any of these features were rated "significant".

SCENIC QUALITY

Outstanding scenic quality: 26 lakes; 6,204 surface acres

Significant scenic quality: 40 lakes; 36,558 surface acres

Lakes with outstanding scenic quality were typically undeveloped and surrounded by areas of high and complex relief. At these lakes the surrounding terrain creates a visually pleasing setting by contrasting with the flat aspect of a lake surface and the openness of the sky. Irregular shorelines and islands in lakes add to the overall visual diversity and scenic beauty.

Lakes with significant scenic quality possessed the same general features as the outstanding lakes, but in smaller proportions. Several lakes in the significant category would have been rated outstanding had they been undeveloped.

Three areas in the organized townships contain especially scenic lakes:

- o Approximately 10 miles east of Bangor, 11 lakes are clustered around a small series of mountains and large hills. The surrounding terrain is relatively flat, making the mountains appear even larger. In addition, these lakes contain irregular shorelines, islands, rockslides and beaches. All of these features create a visually pleasing setting.
- o North of Dover Foxcroft and south of Moosehead Lake lies a mountainous region full of spectacular lakes. Extremely clear water, lack of shoreline development, and highly complex surrounding relief, makes these lakes very scenic. Most of the surrounding mountains are forested, which adds to the scenic integrity of the region.

- o Lakes on Mount Desert Island, largely within Acadia National Park, are well known for their scenic beauty. These lakes are surrounded by towering rocky ridges and mountains which rise directly from the ocean. Mount Desert Island lakes have forested shorelines and little development.

A detailed description of this assessment of scenic lake features is contained in the report An Evaluation Of Scenic Quality On Lakes In Maine's Organized Towns completed as part of this project.

SHORELINE CHARACTER

Outstanding shoreline character: 13 lakes; 31,821 surface acres
 Significant shoreline character: 48 lakes; 38,276 surface acres

Extensive beaches, bouldered shores, and protruding ledges were the most common features observed along lakes rated as outstanding. Almost all of the best shorelines are undeveloped; the exception to this is Sebago Lake. Although this lake is extensively developed, it contains an abundance of accessible large sandy beaches, one of which is a barrier spit beach, a rare feature for Maine lakes. Seven lakes rated outstanding had rocky shores with large boulders. These lakes are all relatively undeveloped; most are easily accessible. Good potential for campsites exists at six of these seven lakes.

Fourteen lakes rated as significant contain open shorelines that offer potential for water access and campsites. Eleven lakes contain sand beaches varying from small pockets to large broad beaches. For instance, Lake George has 2 large broad beaches, although both sites are developed. Protruding, slab, and rocky shore bedrock features were observed on 11 of the 32 lakes with significant shoreline features.

Four lakes rated significant for shoreline character had features that were particularly noteworthy:

- o North Pond in Sumner, which has especially steep banks;
- o Forest Lake in Canton, which has large ledges;
- o Mine Pond in Porter, which has a rock slide; and
- o Joe's Pond in Rumford, which is located at a high elevation.

All four lakes are completely undeveloped.

A detailed description of the beach component of this assessment can be found in Lake Beaches in Maine's Organized Towns, prepared in conjunction with this project.

CULTURAL FEATURES

Outstanding cultural features: 13 lakes; 55,937 surface acres

Significant cultural features: 22 lakes; 27,508 surface acres

Carriage path systems around the lakes were the most common cultural feature reported on lakes receiving an outstanding rating. These paths were important transportation systems prior to the development of motorized vehicles. Most of the other lakes rated "outstanding" contain multiple sites that are eligible for registration on the National Register of Historic Places.

The following lakes received an outstanding rating for cultural features:

<u>DIFW Region</u>	<u>Lake</u>	<u>Town</u>	<u>Size (acres)</u>
A	Long Lake	Bridgton	4876
A	Panther Pond	Raymond	1439
A	Sebago Lake	Sebago	28771
B	Sabattus Pond	Greene	1962
C	Bubble Pond	Bar Harbor	32
C	Eagle Lake	Bar Harbor	436
C	Jordon Pond	Mount Desert	187
C	Long Pond	Mount Desert	897
C	Lower Hadlock P	Mount Desert	39
C	Upper Hadlock P	Mount Desert	35
C	Alamoosook Lake	Orland	1133
E	Sebec Lake	Williamantic	6803

Most of the lakes with "significant" features are located in the southern part of the state. Lakes rated significant for cultural features include:

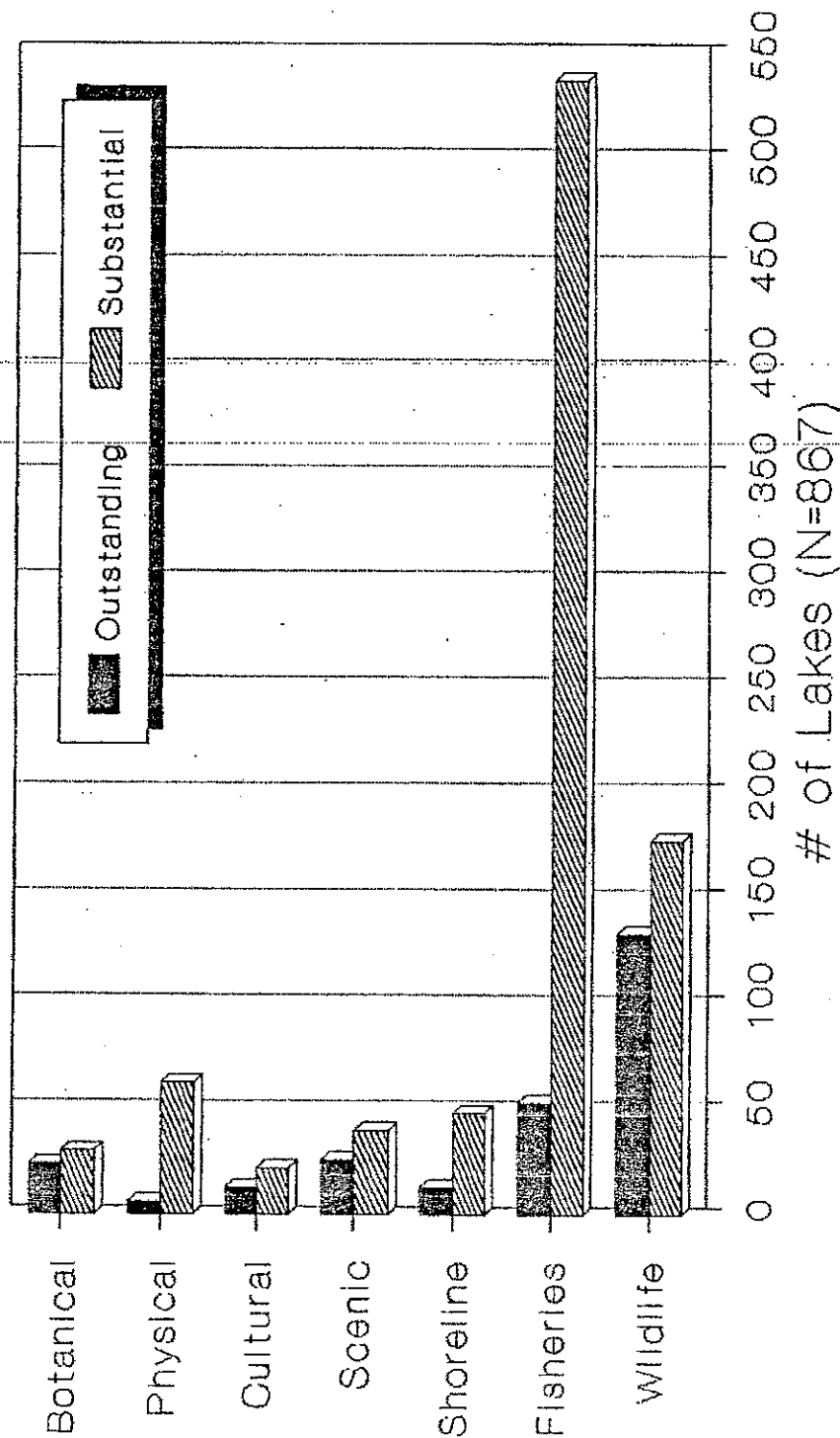
<u>DIFW Region</u>	<u>Lake</u>	<u>Town</u>	<u>Size (acres)</u>
A	Thomas Pond	Casco	442
A	Kezar Pond	Fryeburg	1299
A	Lovewell Pond	Fryeburg	1120
A	Pleasant Pond	Fryeburg	239
A	Northeast Pond	Lebanon	778
A	Kezar Lake	Lovell	2600
A	Pennesseewassee	Norway	922
A	Thompson Lake	Oxford	4426
A	Lower Range Pond	Poland	290
A	Bear Pond	Waterford	218
B	Sennebee Pond	Appleton	532
B	Ellis Pond	Brooks	93
B	Pleasant Pond	Gardiner	746
B	Damariscotta Lake	Jefferson	4381
B	Seven Tree Pond	Union	523
B	Webber Pond	Vassalboro	1201
B	North Pond	Warren	338
B	South Pond	Warren	548

C	Lake Lucerne	Dedham	828
C	Jordan Pond	Mount Desert	187
C	Lower Patten Pond	Surry	741
D	Brandy Pond	Pleasant Ridge PLT	2
F	Pushaw Lake	Old Town	5056

To protect sensitive areas this study does not identify specific cultural features or locations. Further, many of the known or suspected archaeologic sites associated with lakes have not been thoroughly investigated or documented. Further field work will be necessary before the actual significance of many of these sites can be determined.

The findings for all resource categories are summarized in the graph on the following page.

Maine Lakes Assessment Resource Values (Organized Townships)



MAINE'S FINEST LAKES

Methods Used to Determine Statewide Significance

All of Maine's 6000 plus lakes are significant environmental resources and should be managed so as to maintain their natural values. However, as with all natural resources, priorities must be set when allocating management efforts. Through the Critical Areas Program and other state programs the State of Maine has a history of defining resource management priorities based on relative resource significance. The identification of resources that are of statewide significance is central to this concept.

The Maine Wildlands Lake Assessment previously established an objective standard for comparatively ranking lakes that is based on the cumulative significance of features associated with a given lake. Four classes of lakes were identified: 1A (the highest classification), 1B, 2, and 3. "1A" lakes have multiple outstanding natural values or one outstanding and four or more significant values; "1B" lakes have a single outstanding natural value; class "2" lakes have no outstanding values but at least one significant resource; class "3" lakes have no known outstanding or significant values. Under this scenario it follows that lakes eligible for classification as a 1A lake are of statewide significance and that individual features receiving an "outstanding" rating should be considered to be of statewide significance. Thus, a 1B lake will have an individual feature of statewide significance but the lake itself will not be given the highest rating.

The current project adopted this standard for lakes and ponds in the organized townships. The analysis did not give different weights to lakes in organized and unorganized townships, nor did it attempt to achieve equal distribution for counties, river basins, or other sub-state regions. Rather, it set an absolute standard that is consistent throughout the state. Lakes meeting this standard are included in the list of statewide significant lakes regardless of location. This does not, of course, suggest that lakes should not be viewed from their local or regional context. From the local perspective a lake that does not receive a statewide significance rating but that is an area with relatively few significant lakes should arguably receive special management attention regardless of its statewide rating.

Findings

The Land Use Regulation Commission's Wildlands Lake Assessment surveyed 1511 lakes over ten acres in size. 913 of these were found to possess at least one significant or outstanding resource value. 123 of these were rated 1A, that is, they had two or more outstanding values or one outstanding value and four or more significant values. 207 lakes were rated 1B (one outstanding value).

The assessment of lakes in organized towns considered 867 lakes over ten acres in size. (Note that lakes partially in the unorganized townships were assessed during the LURC study.) Applying the same standard to lakes in organized towns, 753 were found to

possess at least one significant or outstanding resource value. 38 of these met the requirements for the highest, or 1A, rating. 189 received a 1B rating. The organized township findings are graphically represented on the following pages.

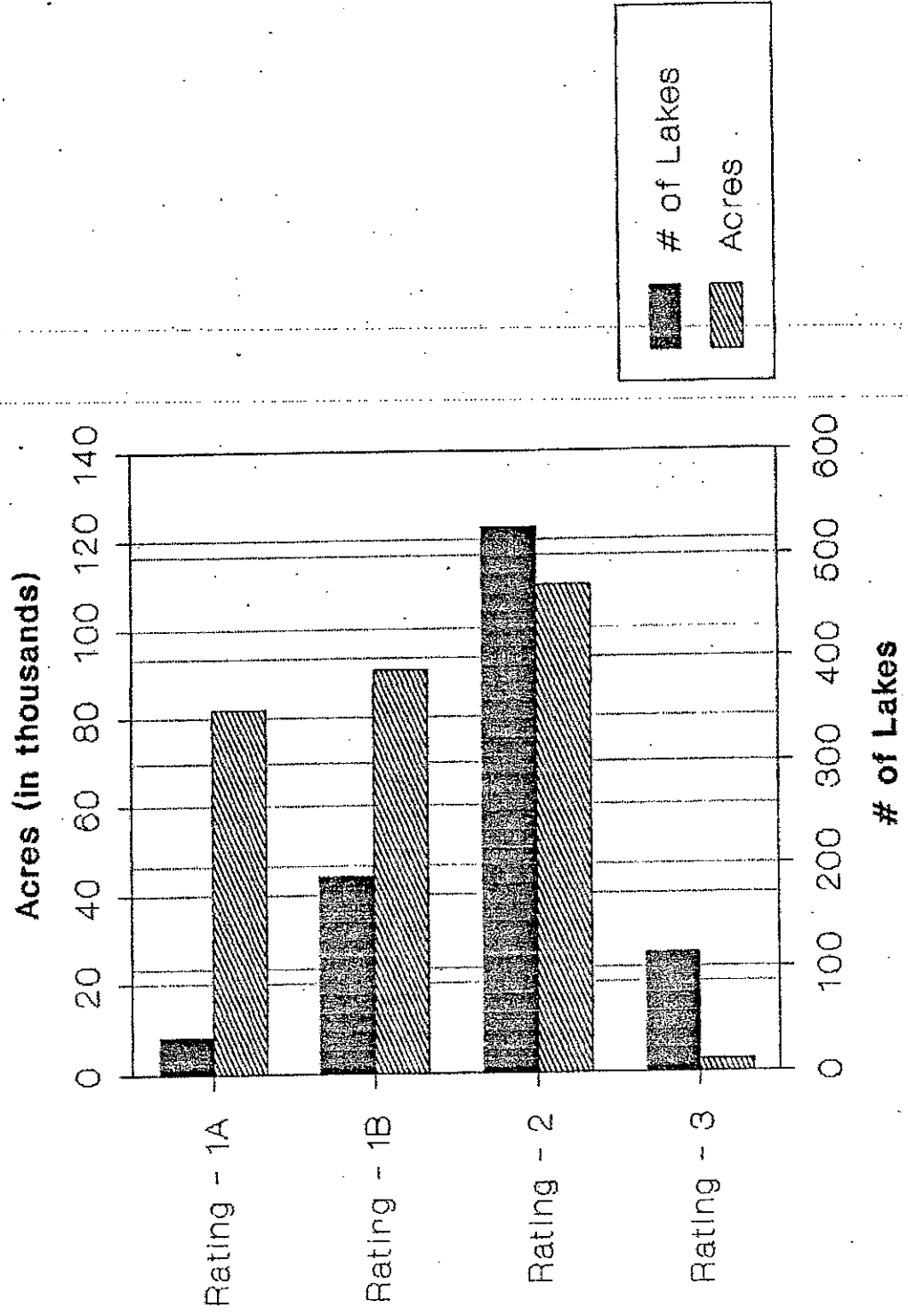
These findings clearly indicate a disparity between the value of lakes in the unorganized territories and those in the organized towns. This, however, is not altogether surprising. The lake resources of southern Maine and other organized areas of the state differ from those in more remote areas. They differ both in terms of physical characteristics and adjacent development. Lakes in the unorganized territories tend to be found in mountainous terrain or in areas with shallow bedrock. They are almost always less developed than their counterparts in organized towns which translates to more pristine wildlife habitat and oftentimes higher scenic value. Lakes in organized towns, by way of contrast, are largely located in lowland areas near centers of population. In these areas there are fewer lakes and those that do exist have less pronounced shoreline features, more access roads, and fewer miles of undeveloped shoreline. Natural resource features associated with these lakes often have affected by prior development.

It is important to note that both the LURC project and the current project relied heavily on existing information to rate lake resource features. Due to the large number of lakes in the state, as well as the relative lack of field surveys on these lakes, it is quite possible that some important features have been overlooked. Because of this, these lake ratings should be regarded as minimal findings. Some class 3; 2 or 1B lakes may be more significant than their rating indicates.

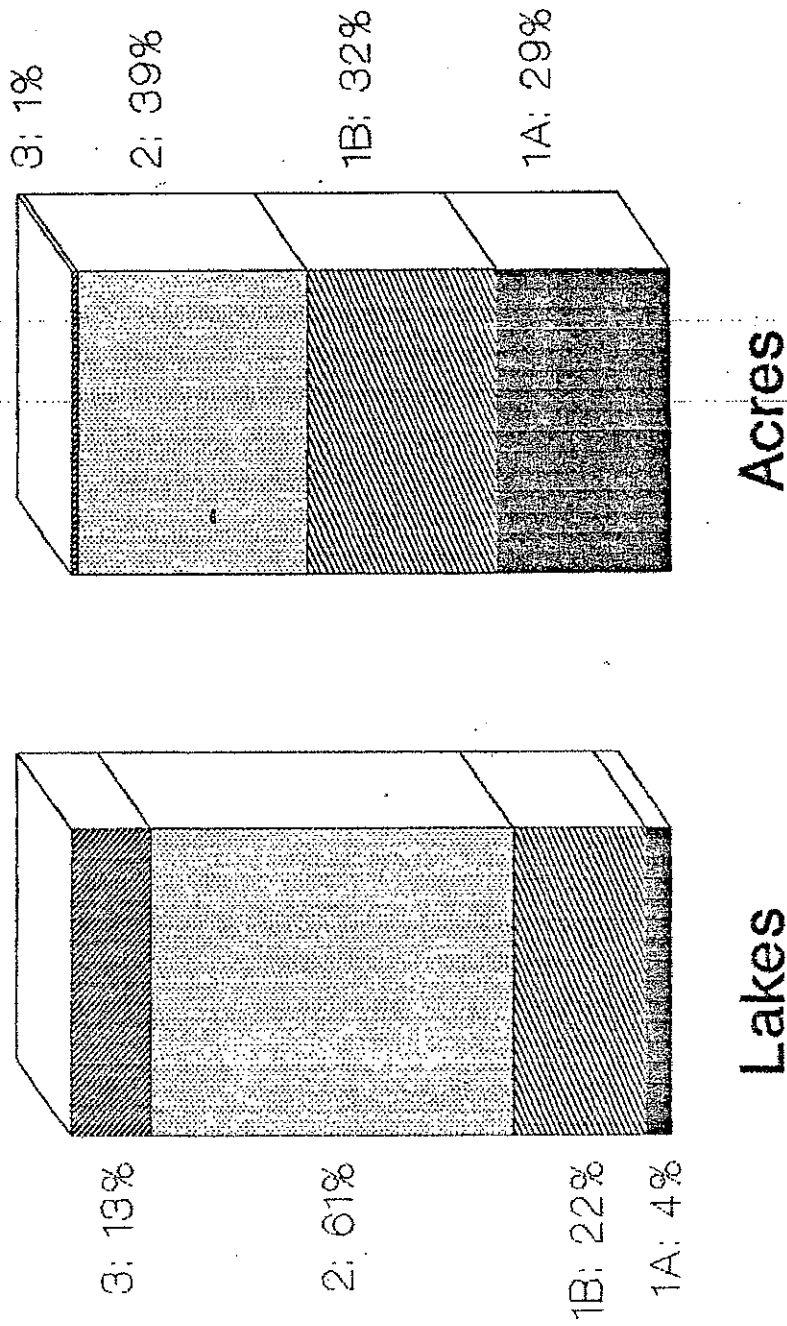
In the next section all lakes within the state that received a 1A rating are listed and their features summarized. Each of these lakes deserves recognition as being among the state's finest. Lakes are presented in two groups - those in the organized townships, and those in the unorganized townships. Within these two groups lakes are listed alphabetically. A summary of findings on all lakes in the organized towns is included as an appendix to this report.

Maine Lakes Assessment

Final Ratings - Organized Townships



Maine Lakes Assessment Final Ratings - Organized Townships



N= 867 Lakes and 285,205 Acres

Appendix D: Summary of Findings for Lakes in Maine's Organized Townships

On the following pages all lakes that are ten acres or more in size are listed alphabetically by township. For each lake the final ratings from each resource category (fish, cultural features, etc.) are presented. An "O" signifies an outstanding resource, while an "S" signifies a significant resource. A blank indicates that either the lake did not meet the study's minimum standards for that particular resource or there was inadequate information to draw conclusions.

Lakes that are located wholly or partially in unorganized townships are not included. For a summary of findings on these lakes see Maine Wildlands Lake Assessment: Findings (June 1, 1987) or contact the Land Use Regulation Commission.

Maine Lakes Assessment
Organized Townships

Lake Name	Lake #	IFW Region	Size (Acres)	Botanic	Physical	Cultural	Scenic	Shoreline	Fisheries	Wildlife	Overall Rating
** TOWNSHIP NAME: WELD											
WEBB (WELD) L	3672	D	2173					S	S	0	1B
** TOWNSHIP NAME: WELLS											
ELL (L) P	0119	A	32						S	0	1B
** TOWNSHIP NAME: WESLEY											
OTTER L	1266	C	44						S		2
** TOWNSHIP NAME: WEST BATH											
WINNEGANCE P	0037	B	137						S		2
** TOWNSHIP NAME: WEST PARIS											
MOOSE P	3496	A	97					S	S		2
** TOWNSHIP NAME: WESTON											
BRACKETT L	1068	F	576						S		2
FAULKNER L	1064	F	70						S		2
** TOWNSHIP NAME: WHITEFIELD											
GIVENS (LONGFELLOW) P	5450	B	20							0	1B
WEARY P	5380	B	42							0	1B
** TOWNSHIP NAME: WHITING											
INDIAN L	1362	C	120			S			S		2
ORANGE L	1364	C	234			S			S	0	1B
ROARING L	1412	C	51						S	S	2
** TOWNSHIP NAME: WILLIMANTIC											
BADGER P	0860	E	15						S		2
GRINDSTONE P	0862	E	26						S		2
MUD GREENWOOD P	0866	E	23				D				1B
SEBEC L	0848	E	6803		S	0		S	0		1A
** TOWNSHIP NAME: WILTON											
PEASE P	5198	D	109						S	S	2
VARNUM P	3600	D	331						S	S	2
WILSON P	3602	D	563						S	0	1B
** TOWNSHIP NAME: WINDHAM											
COLLINS P	3728	A	42						S		2
DUCK P (LITTLE)	3730	A	43						S		2
DUNDEE P	3732	A	197						S		2
FOREST L	3712	A	210			S			S		2
GORHAM P (NORTH)	9705	A	94						S		2
MUD P (LOWER)	3720	A	8								2
MUD P (UPPER)	3722	A	7								3

